

## WHAT IS CLAIMED IS:

1        1.    In a communication system in which space-time encoded  
2    data is transmitted at a first location and at least at a second  
3    location for communication to a receive station, an improvement of  
4    apparatus for the receive station for decoding the space-time  
5    encoded data received thereat, said apparatus comprising:

6            a decoder coupled to receive indications of the space-  
7    time encoded data received at the receive station, said decoder for  
8    directly combining values of the space-time encoded data  
9    transmitted from different ones of the first and at least second  
10   locations to the receive station and for detecting values of  
11   symbols of the data, once combined.

12           2.    The apparatus of claim 1 wherein the space-time encoded  
1    data transmitted at the first and at least second locations  
2    comprises a space-time encoded block of data, and wherein said  
3    decoder directly combines values of the space-time encoded block.

4           3.    The apparatus of claim 2 wherein said decoder further  
1    forms a sequence estimate, the sequence estimate formed of detected  
2    values of the data, once combined.

1           4.    The apparatus of claim 1 wherein the communication system  
2 comprises a radio communication system, wherein the first location  
3 at which the space-time encoded data is transmitted comprises a  
4 first antenna transducer, wherein the second location at which the  
5 space-time encoded data is transmitted comprises a second antenna  
6 transducer, the second antenna transducer spaced apart from the  
7 first antenna transducer, wherein the receive station comprises a  
8 radio receiver, and wherein said decoder is coupled to receive  
9 indications of the space-time encoded data received at the radio  
10 receiver.

1           5.    The apparatus of claim 4 wherein the space-time encoded  
2 data transmitted at the first antenna transducer is transmitted  
3 upon a first communication path to the receive station, wherein the  
4 space-time encoded data transmitted at the second antenna  
5 transducer is transmitted upon a second communication path to the  
6 receive station, wherein the receive station comprises at least one  
7 receive-antenna transducer coupled to transduce indications of the  
8 space-time encoded data transmitted upon the first and second  
9 communication paths, respectively, into electrical form, and  
10 wherein the indications of the space-time encoded data to which  
11 said decoder is coupled to receive are in electrical form,  
12 subsequent to reception at the receive-antenna transducer.

1           6.    The apparatus of claim 1 wherein the directly-combined  
2 values of the space-time encoded data formed by said decoder  
3 comprise a real-valued component portion and an imaginary-valued  
4 component portion.

1           7.    The apparatus of claim 6 wherein detected values of the  
2 symbols of the data, once combined, formed by said decoder comprise  
3 a detected value of the real-valued component portion and a  
4 detected value of the imaginary-valued component portion.

1           8.    The apparatus of claim 7 wherein the receive station  
2 further comprises a detected-data value operation for operating  
3 upon detected data, the detected data upon which said detected-data  
4 value operates comprised of the detected values of the symbols  
5 formed by said decoder.

1           9.    The apparatus of claim 8 wherein the detected values of  
the symbols formed by said decoder comprise at least a first block  
of space-time decoded data symbol values.

1           10.   The apparatus of claim 1 wherein the values of the space-  
time encoded data transmitted at the first location and values of  
the space-time encoded data transmitted at the second location are  
correlated with one another and wherein said decoder includes a  
matched filter for performing successive matched filter operations  
5 upon the indications of the space-time encoded data received  
6 thereat.  
7

1           11. In a method for communicating in a communication system  
2 in which space-time encoded data is transmitted at a first location  
3 and at least a second location for communication to a receive  
4 station, an improvement of a method for decoding the space-time  
5 encoded data, once received at the receive station, said method  
6 comprising:

7           directly combining values of the space-time encoded data  
8 transmitted from different ones of the first and at least second  
9 locations to the receive station; and

10           detecting values of symbols of the data, once combined  
11 during said operation of directly combining.

12           12. The method of claim 11 wherein the space-time encoded  
13 data transmitted at the first and at least second locations  
14 comprises a space-time encoded block of data and wherein said  
15 operation of directly combining comprises directly combining values  
16 of the space-time encoded block.

1           13. The method of claim 12 further comprising the operation  
2 of forming a sequence estimate, the sequence estimate formed of  
3 detected values of the data detected during said operation of  
4 detecting.

1           14. The method of claim 11 wherein the communication system  
2 comprises a radio communication system, wherein the first location  
3 at which the space-time encoded data is transmitted comprises a  
4 first antenna transducer, wherein the second location at which the  
5 space-time encoded data is transmitted comprises a second antenna  
6 transducer, the second antenna transducer spaced apart from the  
7 first antenna transducer, wherein the receive station comprises a  
8 radio receiver, said operation comprising the further operation,  
9 prior to said operation of directly combining, of receiving  
10 indications of the space-time encoded data at the radio receiver.

1           15. The method of claim 14 wherein the space-time encoded  
2 data transmitted at the first antenna transducer is transmitted  
3 upon a first communication path to the receive station, wherein the  
4 space-time encoded data transmitted at the second antenna is  
5 transmitted upon a second communication path to the receive  
6 station, wherein the receive station comprises at least one receive  
7 antenna transducer and wherein said operation of receiving  
8 comprises transducing indications of the space-time encoded data  
9 transmitted upon the first and second communication paths,  
10 respectively, into electrical form.

1           16. The method of claim 11 wherein directly-combined values  
2 of the space-time encoded data formed during said operation of  
3 directly combining comprises a real-valued component portion and an  
4 imaginary-valued component portion.

1           17. The method of claim 16 wherein detected values of the  
2 symbols of data detected during said operation of detecting  
3 comprise a detected value of the real-valued component portion and  
4 a detected value of the imaginary-valued component portion.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50

1           18. The method of claim 17 further comprising the operation  
2 of operating upon detected data formed during said operation of  
3 detecting.

1           19. The method of claim 18 wherein the detected values of the  
2 symbols formed during said operation of decoding comprise at least  
3 a first block of space-time decoded data symbol values.

1           20. The method of claim 11 wherein values of the space-time  
2 encoded data transmitted at the first location and values of the  
3 space-time encoded data transmitted at the second location are  
4 correlated to one another and wherein said method further comprises  
5 the operation of performing successive matched filter operations  
6 upon the indications of the space-time encoded data received  
7 thereat.